Post-Tensioning for Healthcare Facilities

ENGINEERING
REINFORCEMENT SYSTEMS
CONSTRUCTION
REPAIRS & MODIFICATIONS

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▲ Post-tensioning provides design flexibility

▲ Post-tensioned parking structure

Post-Tensioned, Cast-In-Place Concrete for Healthcare Facilities

Key Advantages

- Reduces Building Volume
- Efficient Construction
- Lower Operating Costs
- Increased Spans
- Reduced Vibrations
- Enhanced Crack and Deflection Control
- Increased Durability
- Seismic Resistance
- Adaptability
- Design Flexibility

Healthcare Structure Applications

- New Construction
- Additions / Expansions
- Patient Towers
- Research Buildings
- Office Buildings
- Extended Care Facilities
- Mat Foundations
- Parking Structures
- Dormitories

Reduced Environmental Impact

VSL's post-tensioning systems also play a major role in keeping the construction process—and the structure itself—green. Because of its durability, ease of production and cooling properties, concrete is already widely accepted as a viable green building material.

The use of post-tensioning further elevates its environmentally friendly status by ensuring a more efficient use of materials:

- **CONCRETE FRAME**
  Post-tensioned concrete can save up to a foot of floor height per level versus traditionally reinforced concrete. The use of bonded systems in slabs increases spans therefore reducing the number of columns required. Additionally, concrete construction typically involves the use of local resources, both material and labor, which results in reduced transportation and shipping costs.
- **CONCRETE FOUNDATION**
  The volume reduction of a post-tensioned concrete frame, relative to building height, reduces the lateral load requirements, leading to a reduction in the overall mass of the foundation system. Post-tensioning may also be used in the mat foundation to further reduce the concrete and reinforcing steel.
- **FACADE, CLADDING, M/E/P SYSTEMS**
  The reduction in floor height with each level of the structure significantly reduces the high cost of building cladding and mechanical, electrical and plumbing systems required for state-of-the-art healthcare facilities. Additionally, the flat soffits of bonded post-tensioned slabs provide greater flexibility in routing M/E/P systems.
- **OPERATING ENERGY EFFICIENCY**
  The overall reduction in building volume can significantly reduce energy consumption from heating, cooling and air filtration throughout the facility.

▲ VSLAB+® Bonded Slab tendons in flat plastic ducts

▲ Bonded multistrand post-tensioning system

About VSL Post-Tensioning Systems

The Leader in Innovative Solutions for Reinforcement

Recognized as the industry leader in providing durable post-tensioning and specialty reinforcement systems, VSL designs, manufactures and installs post-tensioning systems and components for both new construction and the repair and modification of existing structures. VSL services and products provide optimal solutions and ensure the best value for our customers' needs. **Below are post-tensioning systems that VSL applies for healthcare facilities:**

Bonded Slab Systems

VSL's VSLAB+® Bonded Slab Systems consist of fully encapsulated, bonded multistrand (two to five strands) tendons contained in ducts filled with grout that bonds the strands to the surrounding concrete. VSLAB+ allows for thin slab design and may be cut with only localized loss of capacity. Design advantages include increased span lengths and load-carrying capacities.

HEALTHCARE APPLICATIONS: Patient towers subject to modifications, office/administration buildings and transfer plates/girders.

Bonded Multistrand Systems

A single multistrand tendon can hold up to fifty-five strands encased in duct and is fully bonded using a high-performance grout. Used for large structural members such as beams and transfer girders, design advantages include increased span lengths and load-carrying capacity and reduced deflection.

HEALTHCARE APPLICATIONS: Structural elements requiring large loads such as transfer plates/girders for towers and parking structures.

Unbonded Monostrand Systems

Adaptable to a variety of structures, unbonded monostrand can be easily, rapidly and economically installed. VSL's monostrand systems use 0.5″ and 0.6″ diameter strands coated with a layer of specially formulated grease with an outer layer of seamless plastic to provide protection against corrosion.

HEALTHCARE APPLICATIONS: Parking structures, office/administration buildings, dormitories, extended care and transfer plates/girders.

▲ Large transfer beam with bonded multistrand post-tensioning

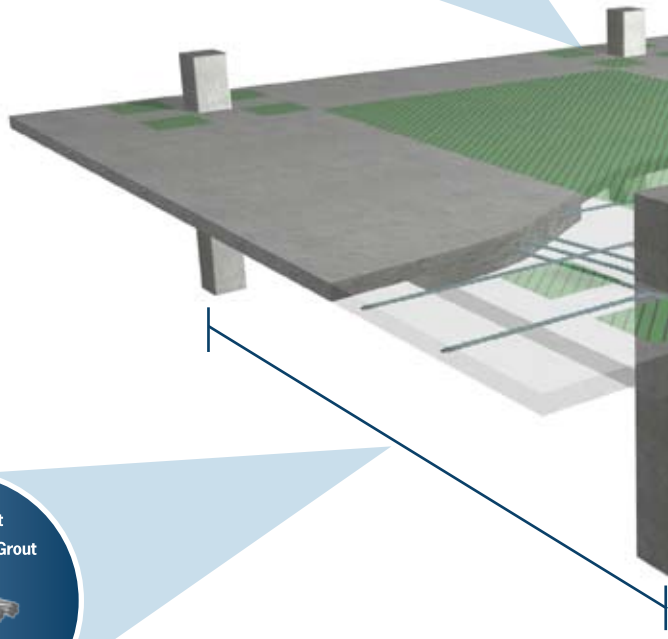
▲ Slab markings identify tendon locations

Adaptability, Ease of Future Modifications

In areas of healthcare facilities that are subject to structural modifications, such as new openings and mechanical systems installation, VSL offers bonded slab systems as a viable alternative to unbonded monostrand systems. With bonded systems, tendon free areas can be designed into the slabs at designated locations and around columns for future penetrations. Additionally, the open areas can be marked on the top and bottom of all slabs or ground penetrating radar (GPR) can be used easily to locate tendons.

Vibration Reduction

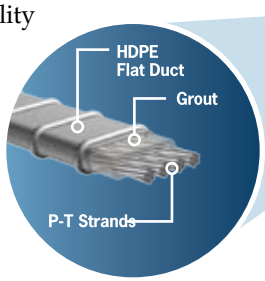
Post-tensioned, cast-in-place concrete structures offer maximum stiffness and vibration control over steel structures – without adding significant building mass.



Design Flexibility / Versatility

Cast-in-place, post-tensioned construction allows for versatility in structural layout. Structural floor configurations are virtually limitless and shapes and forms are easily achieved in a cost-effective manner.

Use of VSL's bonded slab systems (2-5 strands per tendon) allow for increased column spacing in slabs, while multistrand systems (up to 55 strands per tendon) have been used for transfer beams to create open spaces that carry the loads of the structure above it.

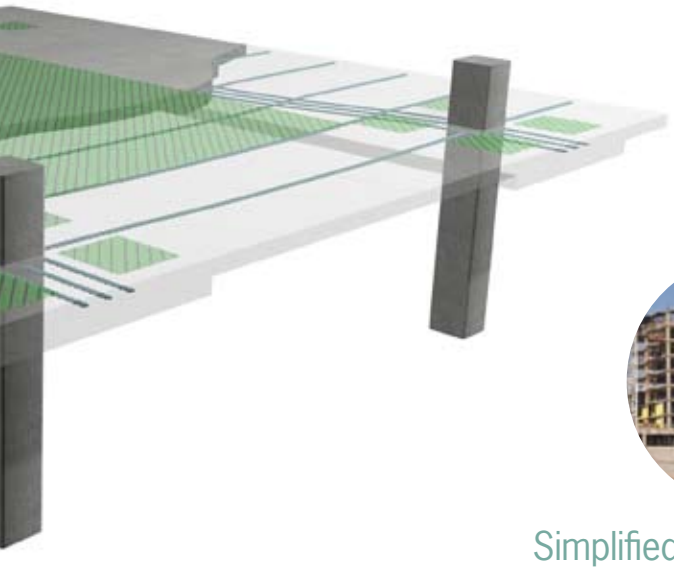


▲ Post-tensioned mat foundation construction

▲ Post-tensioned slabs, transfer plates and beams

Seismic Resistance

In comparison to conventionally reinforced structures, post-tensioned concrete structures have a lower floor height that allows for reduced seismic forces at the foundation. This reduction in forces allows for less cracking and residual displacement during seismic activity.

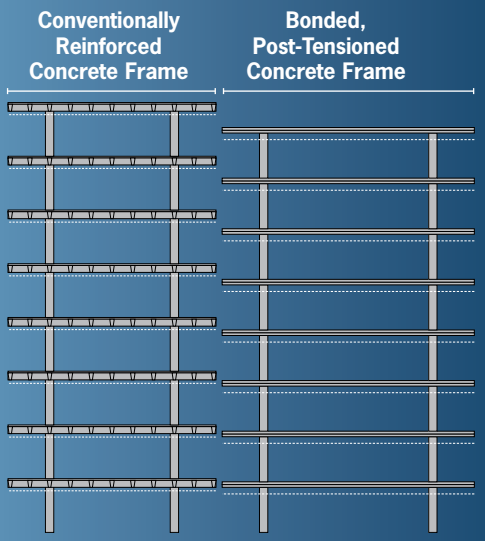


Simplified Construction

Compared to a conventionally reinforced concrete structure, the formwork required for a post-tensioned structure is simplified allowing for a rapid pace of construction. The reduction of mild steel reinforcement also allows for quicker placement and easier consolidation of concrete.

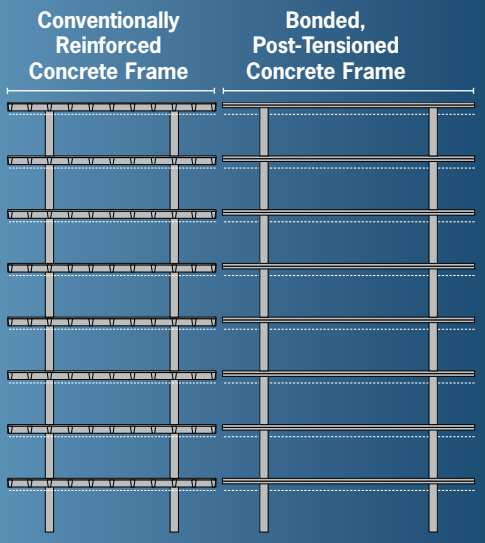
Frame System Comparison

NEW CONSTRUCTION



- Increased Column Spans
- Reduced Building Height

EXPANSION / ADDITION



- Increased Column Spans
- Maintain Floor Height

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